Claims:

1. A method for screening, diagnosis or prognosis of breast cancer in a subject, for determining the stage or severity of breast cancer in a subject, for identifying a subject at risk of developing breast cancer, or for monitoring the effect of therapy administered to a subject having breast cancer, said method comprising:

(a) analyzing a test sample of body fluid from the subject by two dimensional electrophoresis to generate a two-dimensional array of features, said array comprising at least one chosen Breast Cancer-Associated Feature (BF) selected from BF-1, BF-2, BF-3, BF-4, BF-5, BF-7, BF-8, BF-9, BF-10, BF-12, BF-13, BF-14, BF-15, BF-16, BF-17, BF-18, BF-19, BF-20, BF-22, BF-23, BF-26, BF-27, BF-28, BF-29, BF-30, BF-31, BF-32, BF-33, BF-34, BF-35, BF-36, BF-37, BF-38, BF-39, BF-40, and BF-41, whose relative abundance correlates with the presence, absence, stage or severity of breast cancer or predicts the onset or course of breast cancer; and

(b) comparing the abundance of each chosen feature in the test sample with the abundance of that chosen feature in body fluid from one or more persons free from breast cancer, or with a previously determined reference range for that feature in subjects free from breast cancer, or with the abundance at least one Expression Reference Feature (ERF) in the test sample.

2. The method of claim 1, wherein the body fluid is serum or plasma.

3. The method of claim 1, wherein step (b) comprises comparing the abundance of each chosen feature in the sample with the abundance of that chosen feature in serum from one or more persons free from breast cancer or with a previously determined reference range for that chosen feature in subjects free from breast cancer.

4. A method for screening, diagnosis or prognosis of breast cancer in a subject, for determining the stage or severity of breast cancer in a subject, for identifying a subject at risk of developing breast cancer, or for monitoring the effect of therapy administered to a subject having breast cancer, comprising quantitatively detecting, in a sample of serum or plasma from the subject, at least one of the following Breast Cancer-Associated Protein Isoforms

(BPIs): BPI-1, BPI-5, BPI-6, BPI-9, BPI-10, BPI-11, BPI-12, BPI-13, BPI-14, BPI-19, BPI-20, BPI-21, BPI-23, BPI-24, BPI-25, BPI-27, BPI-28, BPI-29, BPI-31, BPI-32, BPI-33, BPI-34, BPI-37, BPI-40, BPI-48, BPI-49, BPI-50, BPI-51, BPI-52, BPI-53, BPI-54, BPI-55, BPI-56.

5. A method for screening, diagnosis or prognosis of primary breast cancer in a subject, comprising quantitatively detecting, in a sample of serum from the subject, at least one of the following Breast Cancer-Associated Protein Isoforms (BPIs): BPI-1, BPI-5, BPI-6, BPI-9, BPI-10, BPI-11, BPI-12, BPI-13, BPI-14, BPI-40, BPI-50, BPI-53, BPI-54, BPI-55.

6. A method for screening, diagnosis or prognosis of metastatic breast cancer in a subject, comprising quantitatively detecting, in a sample of serum from the subject, at least one of the following Breast Cancer-Associated Protein Isoforms (BPIs): BPI-19, BPI-20, BPI-21, BPI-23, BPI-24, BPI-25, BPI-27, BPI-28, BPI-29, BPI-31, BPI-32, BPI-33, BPI-34, BPI-37, BPI-48, BPI-49, BPI-51, BPI-52, BPI-53, BPI-56.

7. The method of claim 4, comprising detecting the Breast Cancer-Associated Protein Isoform (BPI) BPI-27.

8. The method of claim 4, comprising detecting the Breast Cancer-Associated Protein Isoform (BPI) BPI-37.

9. The method of claim 4, wherein the step of quantitatively detecting comprises testing at least one aliquot of the sample, said step of testing comprising:

(a) contacting the aliquot with an antibody that is immunospecific for a preselected BPI; and

(b) quantitatively measuring any binding that has occurred between the antibody and at least one species in the aliquot.

10. The method of claim 9, wherein the step of quantitatively detecting comprises testing a plurality of aliquots with a plurality of antibodies for quantitative detection of a plurality of preselected BPIs.

11. The method of claim 9, wherein the antibody is a monoclonal antibody.

12. A preparation comprising the isolated Breast Cancer-Associated Protein Isoform (BPI) BPI-49.

13. A preparation comprising an isolated human protein, wherein the protein comprising a peptide having the following sequence: AN or AGG.

14. The preparation of claim 13, wherein the protein has an isoelectric point (pI) of about 6.08 and an apparent molecular weight (MW) of about 59520.

15. The preparation of claim 14, wherein the pI is within 10% of 6.08 and the MW is within 10% of 59520.

16. An antibody capable of immunospecific binding to one of the following Breast Cancer-Associated Protein Isoforms (BPIs): BPI-1, BPI-5, BPI-6, BPI-9, BPI-10, BPI-11, BPI-12, BPI-13, BPI-14, BPI-19, BPI-20, BPI-21, BPI-23, BPI-24, BPI-25, BPI-27, BPI-28, BPI-29, BPI-31, BPI-32, BPI-33, BPI-34, BPI-37, BPI-40, BPI-48, BPI-49, BPI-50, BPI-51, BPI-52, BPI-53, BPI-54, BPI-55, BPI-56.

17. The antibody of claim 16, which is selected from the group consisting of monoclonal antibodies, bispecific antibodies, human antibodies, humanized antibodies, chimeric antibodies, single chain antibodies, and active fragments thereof.

18. A pharmaceutical composition comprising a therapeutically effective amount of an antibody or a fragment or derivative of an antibody as claimed in claim 16, wherein the fragment or derivative contains the binding domain of the antibody and a pharmaceutically acceptable carrier.

19. A method of treating or preventing breast cancer, comprising administering to a subject in need of such treatment or prevention a therapeutically effective amount of an antibody or a fragment or derivative of an antibody as claimed in claim 16, wherein the fragment or derivative contains the binding domain of the antibody.

20. A method of treating or preventing breast cancer, comprising administering to a subject in need of such treatment or prevention a therapeutically effective amount of a nucleic acid encoding one or more of the following Breast Cancer-Associated Protein Isoforms (BPIs): BPI-1, BPI-5, BPI-6, BPI-9, BPI-10, BPI-11, BPI-12, BPI-13, BPI-14, BPI-19, BPI-20, BPI-21, BPI-23, BPI-24, BPI-25, BPI-27, BPI-28, BPI-29, BPI-31, BPI-32, BPI-33, BPI-34, BPI-37, BPI-40, BPI-48, BPI-49, BPI-50, BPI-51, BPI-52, BPI-53, BPI-54, BPI-55, or BPI-56.

21. A method of treating or preventing breast cancer, comprising administering to a subject in need of such treatment or prevention a therapeutically effective amount of a nucleic acid that inhibits the expression of one or more of the following Breast Cancer-Associated Protein Isoforms (BPIs): BPI-1, BPI-5, BPI-6, BPI-9, BPI-10, BPI-11, BPI-12, BPI-13, BPI-14, BPI-19, BPI-20, BPI-21, BPI-23, BPI-24, BPI-25, BPI-27, BPI-28, BPI-29, BPI-31, BPI-32, BPI-33, BPI-34, BPI-37, BPI-40, BPI-48, BPI-49, BPI-50, BPI-51, BPI-52, BPI-53, BPI-54, BPI-55, BPI-56.

22. The method of claim 21, wherein the nucleic acid is a BPI antisense nucleic acid or ribozyme.

23. A method of screening for or identifying agents that interact with a BPI, a BPI fragment, or a BPI-related polypeptide, comprising:

(a) contacting a BPI, a BPI fragment, or a BPI-related polypeptide with a candidate agent; and

(b) determining whether the candidate agent interacts with the BPI, the BPI fragment, or the BPI-related polypeptide.

24. A method of screening for or identifying agents that modulate the expression or activity of a BPI or a BPI-related polypeptide, comprising:

(a) contacting a first population of cells expressing a BPI or a BPI-related polypeptide with a candidate agent;

(b) contacting a second population of cells expressing BPI or BPI-related polypeptide with a control agent; and

(c) comparing the level of expression of BPI or BPI-related polypeptide or mRNA encoding BPI or BPI-related polypeptide in the first and second populations of cells, or comparing the level of induction of a cellular second messenger in the first and second populations of cells.

25. A method of screening for or identifying agents that modulate the expression or activity of a BPI or a BPI-related polypeptide, comprising:

(a) administering a candidate agent to a first mammal or group of mammals;

(b) administering a control agent to a second mammal or group of mammals;

(c) comparing the level of expression of the BPI or the BPI-related polypeptide or of mRNA encoding the BPI or the BPI-related polypeptide in the first and second groups, or comparing the level of induction of a cellular second messenger in the first and second groups; and

(d) optionally comparing the levels of expression of the BPI or the BPI-related polypeptide or of mRNA encoding the BPI or the BPI-related polypeptide in the first and second groups, or comparing the level of induction of a cellular second messenger in the first and second groups, to the level of the BPI or the BPI-related polypeptide or of mRNA encoding the BPI or the BPI-related polypeptide in normal control mammals, or comparing the level of induction of a cellular second messenger in normal control mammals.

26. The method of claim 25, wherein the mammals are animal models for breast cancer or human subjects having breast cancer.

27. A method of screening for or identifying agents that modulate the activity of a BPI or a BPI-related polypeptide, comprising

(a) in a first aliquot, contacting a candidate agent with the BPI or the BPI-related polypeptide; and

(b) comparing the activity of the BPI or the BPI-related polypeptide in the first aliquot after addition of the candidate agent with the activity of the BPI or the BPI-related polypeptide in a control aliquot, or with a previously determined reference range.

28. The method of claim 23, wherein the BPI or the BPI-related polypeptide is recombinant protein.

29. An isolated nucleic acid molecule that hybridizes to a nucleotide sequence encoding BPI-49 or its complements.

30. An isolated nucleic acid molecule that hybridizes to a nucleotide sequence encoding at least 10 consecutive amino acids of BPI-49 or its complements.

31. A vector comprising the nucleic acid molecule of claim 29.

32. A host cell genetically engineered to express the nucleic acid molecule of claim 29.

33. A method for screening, diagnosis or prognosis of breast cancer in a subject or for monitoring the effect of an anti-breast cancer drug or therapy administered to a subject, comprising:

(a) contacting at least one oligonucleotide probe comprising 10 or more consecutive nucleotides complementary to a nucleotide sequence encoding a BPI chosen from BPI-1, BPI-5, BPI-6, BPI-9, BPI-10, BPI-11, BPI-12, BPI-13, BPI-14, BPI-19, BPI-20, BPI-21, BPI-23, BPI-24, BPI-25, BPI-27, BPI-28, BPI-29, BPI-31, BPI-32, BPI-33, BPI-34, BPI-37, BPI-40, BPI-48, BPI-49, BPI-50, BPI-51, BPI-52, BPI-53, BPI-54, BPI-55, BPI-56 with an RNA obtained from a biological sample from the subject or with cDNA copied from the RNA wherein said contacting occurs under conditions that permit hybridization of the probe to the nucleotide sequence if present;

(b) detecting hybridization, if any, between the probe and the nucleotide sequence; and

(c) comparing the hybridization, if any, detected in step (b) with the hybridization detected in a control sample, or with a previously determined reference range.

34. An isolated nucleic acid molecule that hybridizes under highly stringent conditions or moderately stringent conditions to the nucleic acid sequence GCNAAY or the nucleic acid sequence GCCAAC.